8. PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

A. GENERAL

This chapter presents the preliminary opinion of probable construction costs for the alternatives presented in Chapters 6 and 7. All of the costs presented herein reflect price levels for the year 2002 and include an allowance of 20 percent for contingencies. The costs do not include administration, legal, and engineering costs; CBU staff salaries or expenses related to the project; permit or plan review fees; or costs for surveying, subsurface investigations, land acquisition, easements, or unusual construction conditions other than those specifically identified herein.

B. ALTERNATIVES

The following alternatives were described in detail in Chapter 7.

1. Alternative A. Expand the 24 mgd Monroe WTP to 36 mgd and replace the existing filters with a membrane filtration system with a capacity of 36 mgd.

Expansion of the Monroe WTP to 36 mgd will necessitate upgrading the existing intake facility to increase the pumping capacity. The existing intake facility was designed to accommodate expansion to 36 mgd. The existing pump intake ports are sized to handle 36 mgd with a velocity through the ports of less than 2 fps. Modifications to the existing intake facility will include removal and replacement of two existing 6 mgd low service pumps with two new 12 mgd pumps, upgrade of the existing potassium permanganate feed system, and upgrade of the existing electrical substation. It is assumed that the existing traveling screens are sized adequately to handle 36 mgd. Other miscellaneous piping and valve modifications will be made, as required to convey 36 mgd.

8. PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

A new 30-inch raw water main is recommended to transfer the additional flow from the intake facility to the plant. The new raw water piping will connect to the existing 36-inch line outside the intake facility. Additional valves will be provided, as required for isolation. The length of the new raw water main is approximately 3,000 linear feet.

A preliminary hydraulic profile analysis indicates that the expansion of the Monroe WTP to a capacity of 36 mgd will require construction of one flocculation/sedimentation basin adjacent the existing basins. The new basin will have a rated capacity of 12 mgd and will be provided with flocculators, circular clarifying equipment, and stainless steel plate settlers.

Modifications to the Filter Building will include removal of the existing filter media and underdrain system and installation of new submerged-type membranes, sized for 36 mgd, in the existing filter boxes. As part of retrofitting the Filter Building, new piping additions and some piping modifications will be required to accommodate the membranes. Also, it is anticipated that a new pre-engineered metal building will be required to house the membrane auxiliary equipment. The building will have an approximate area of 3,000 ft^2.

The firm capacity of the existing Transfer Pump Station will need to be increased from 24 mgd to 36 mgd. This will include the installation of two 6 mgd pumps in the open pump slots and associated piping and valve installations. The existing high service pumps have a firm capacity of 24 mgd; therefore, improvements will be required to increase the capacity to 36 mgd. Two of the 8 mgd pumps will need to be replaced with 14 mgd pumps.

The existing chemical feed systems will need to be upgraded to handle increased chemical dosages associated with the 36 mgd of flow. The upgrades to the existing chemical feed system will include installation of additional equipment, tanks, piping, valves, and associated electrical and controls.

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The existing electrical substation at the treatment plant will need to be upgraded to accommodate the additional electrical load.

A new 36-inch finished water transmission main will be constructed from the Monroe WTP to Harrell and Moffat Roads and will connect to the existing 36-inch finished water transmission main and to the proposed Southeast Transmission Main. The new piping will accommodate the additional flow and provide redundancy to the existing 36-inch finished water piping. The length of the new finished water main is approximately 17,000 linear feet.

For the expansion of the Monroe WTP, additional storage and pumping capacity is required in the South service level to convey water to the Central service level. CBU and Black & Veatch have studied a project, the Southeast Water System Improvements, to provide reliability to the existing transmission main and the South-Central pump station. For Alternative A, this project will be constructed to convey the additional flow and to provide reliability. The Southeast pump station will have an initial firm capacity of 12 mgd, expandable to a firm capacity of 18 mgd, giving a total firm capacity of 36 mgd, expandable to 42 mgd, for the South-Central and Southeast pump stations.

Some basic assumptions have been made regarding the construction materials, components, equipment, and processes. These assumptions are discussed below:

Existing Monroe Intake Facility

- Remove two 6 mgd pumps and replace with 12 mgd pumps.
- Upgrade potassium permanganate feed system.
- New piping and valves.
- Upgrade electrical substation.

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Flocculation/Sedimentation Basin

- One 12 mgd flocculation/sedimentation basin.
- Stainless steel lamella plates.
- Standard clarifier.
- Standard flocculators.
- Cast-in-place concrete construction.

Membrane Treatment Facility

- Submerged type membranes installed in existing filter boxes.
- Pre-engineered metal building for auxiliary equipment.
- Automation and controls.
- Piping modifications.

Existing Transfer Pump Station

- Install new 6 mgd pumps in each of the two open pump slots.
- Electrical and controls.

Existing High Service Pump Station

- Remove two 8 mgd pumps and replace with 14 mgd pumps.
- New adjustable frequency drives.
- Electrical and controls.

Southeast Pump Station

- 12 mgd firm capacity pump station, expandable to 18 mgd firm capacity.
- One engine generator for standby power.
- Single story, brick and block building.
- Concrete foundation.
- 3 pumping units each with 6 mgd capacity, with space for one future pump.
- Pipes installed in pipe chases, no basement.

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Southeast Ground Storage Tank

- 2 MG capacity.
- Prestressed concrete or steel construction.
- 60 foot side water depth.
- 80 foot diameter.

Southeast Transmission Main

- Prestressed concrete or ductile iron piping.
- 8,000 linear feet of 30-inch piping along Harrell Road between Moffat and Rhorer Roads.
- 4,000 linear feet of 36-inch piping along Rhorer Road between Harrell and Sare Roads.
- 12,000 linear feet of 24-inch piping along Sare Road between Rhorer Road and Moores Pike.
- 16,000 linear feet of 24-inch piping along Rhorer Road and Gordon Pike to South Rogers Street then north on South Rogers Street to West on Tapp Road to Rockport Road.
- Valves.
- Fire Hydrants.
- Air Release Manholes.

The opinion of probable cost for Alternative A is presented in Table 8-1. This cost includes the associated electrical and instrumentation costs. All costs for the facilities and water mains assume rock excavation. In addition, the finished water mains cost includes pavement replacement for approximately half of the alignment.

8. PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Table 8-1
Opinion of Probable Construction Cost for Alternative A
Expand the 24 mgd Monroe WTP to 36 mgd

Item	Cost
Intake Facility Improvements	$ 800,000
Expand Monroe WTP to 36 mgd	
Flocculation/Sedimentation Basin (12 mgd)	$ 3,000,000
Membrane Treatment Facility (36 mgd)	$15,000,000
Chemical Feed System Improvements	$ 500,000
Transfer Pump Station Improvements	$ 300,000
High Service Pump Station Improvements	$ 300,000
Electrical Substation Upgrade	$ 500,000
Sitework	$ 600,000
Miscellaneous	$ 1,500,000
Subtotal Expand Monroe WTP to 36 mgd	$21,700,000
Raw and Finished Water Mains (20,000 LF)	$ 5,000,000
Subtotal Intake, Monroe WTP, Water Mains	**$27,500,000**
Southeast Water System Improvements	
Pump Station (12 mgd expandable to 18 mgd)	$ 2,200,000
Ground Storage Tank (2 MG)	$ 1,300,000
Transmission Mains (40,000 LF)	$ 7,500,000
Subtotal Southeast Water System Improvements	**$11,000,000**
Subtotal Probable Cost for Alternative A	**$38,500,000**
Contingencies (20%)	$ 7,700,000
Total Probable Cost for Alternative A	**$46,200,000**

8. PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

As an option to Alternative A, CBU could expand the 24 mgd Monroe WTP in two phases; expand to 30 mgd initially and replace the existing filters with a membrane filtration system with a capacity of 30 mgd. This option reduces the initial capital investment and only those facilities and improvements necessary to supply and treat 30 mgd would be constructed. As water demands increase, the plant would be expanded to 36 mgd. It should be noted that the overall construction cost to complete the expansion in two phases will be more than completing the work in a single phase.

This option would be the same as Alternative A with the following exceptions:

- Only one intake facility pump would be replaced to provide a firm pumping capacity of 30 mgd.
- Only one high service pump would be replaced to provide a firm pumping capacity of 30 mgd.
- The third basin train at the plant would not be constructed until the plant is expanded to 36 mgd.
- Install 30 mgd membrane filtration system in the existing filter boxes instead of 36 mgd.

The new facilities would allow for easy expansion to 36 mgd in the future. The piping would be sized to accommodate a flow of 36 mgd.

The opinion of probable cost for the option to Alternative A is presented in Table 8-2. The cost includes associated electrical and instrumentation costs. All costs for the facilities and water mains assume rock excavation.

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Table 8-2
Opinion of Probable Construction Cost for Option to Alternative A
Expand the 24 mgd Monroe WTP to 30 mgd

Item	Cost
Intake Facility	$ 700,000
Expand Monroe WTP to 30 mgd	
Membrane Treatment Facility (30 mgd)	$13,000,000
Chemical Feed System Improvements	$ 500,000
Transfer Pump Station Improvements	$ 300,000
High Service Pump Station Improvements	$ 300,000
Electrical Substation Upgrade	$ 500,000
Sitework	$ 400,000
Miscellaneous	$ 1,500,000
Subtotal Expand Monroe WTP to 30 mgd	$16,500,000
Raw and Finished Water Mains (20,000 LF)	$ 5,000,000
Subtotal Intake, Monroe WTP, Water Mains	**$22,200,000**
Southeast Water System Improvements	
Pump Station (12 mgd expandable to 18 mgd)	$ 2,200,000
Ground Storage Tank	$ 1,300,000
Transmission Mains (40,000 LF)	$ 7,500,000
Subtotal Southeast Water System Improvements	**$11,000,000**
Subtotal Probable Cost for Option to Alternative A	**$33,200,000**
Contingencies (20%)	$ 6,700,000
Total Probable Cost for Option to Alternative A	**$39,900,000**

8. PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

2. Alternative B. New 12 mgd water treatment plant, expandable to 24 mgd, with membrane filtration, and adjacent the Dillman WWTP. This alternative includes an intake located at the IDNR site on Lake Monroe and retrofit of the 24 mgd Monroe WTP with membrane filtration with a capacity of 24 mgd.

The new water treatment plant will consist of the following:

- Flocculation/sedimentation basins (two trains, each with 6 mgd capacity)
- 12 mgd membrane filtration facility
- Chemical feed and storage facility
- High service pump station
- Administrative Facilities
- Laboratory
- Finished water storage reservoir
- Residuals pumping station
- Site work
- Engine Generators for standby power

For the opinions of probable construction cost for Alternative B, some basic assumptions have been made regarding the facility's construction materials, components, equipment, and processes. These assumptions are discussed below:

Intake Facility

- Pumping and Chemical Feed Structure constructed on the lake shore approximately 50 feet by 50 feet in plan.
- Crib structure located in the lake approximately 15 feet by 15 feet in plan.
- Two directional bore tunnels between the pump and crib structures.
- Cast-in-place concrete construction.

8. PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

- Two separate wetwells in the pump structure for maintenance.
- Two traveling screens.
- 2 pumps equipped with adjustable frequency drives.
- An electrical room.
- A chemical feed room.
- A piping gallery below the operating floor level for pump discharge piping.
- Traveling bridge crane.
- An engine generator for standby power.

Flocculation/Sedimentation Basins

- Two 6 mgd flocculation/sedimentation basin trains.
- Stainless steel lamella plates in each basin.
- Standard clarifier in each basin.
- Standard flocculators in each basin.
- 2-cell rapid mix basin.
- Cast-in-place concrete, common wall construction.

Membrane Treatment Facility

- Submerged or cartridge type membranes (12 mgd capacity).
- Concrete boxes to house the submerged membranes or a building with a slab on grade to house the cartridge membranes.
- Pumping equipment.
- Auxiliary equipment.
- Automation and controls.
- Single story, brick & block building.

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Chemical Feed and Storage Facility

- Single story, brick & block building.
- Cast-in-place concrete foundation.
- Chemical storage and day tanks, designed for liquid storage where practical.
- Metering and feed pumps.

High Service Pump Station

- Brick & block building.
- Cast-in-place concrete foundation.
- 3 pumps at 6 mgd each, with space for 2 additional pumps in the future.
- 2 pumps equipped with adjustable frequency drives.
- Pipe gallery below the operating floor for suction and discharge piping.

Administrative Facilities

- Single story, brick & block building.
- Cast-in-place concrete foundation.
- Offices, storage space, and break room.
- Control room with SCADA system
- Bathrooms with locker facilities.
- Janitor's closet.

Operator Laboratory

- Single story, brick & block building.
- Basic laboratory analysis equipment.
- Laboratory benches and cabinets.

Finished Water Storage

- 2.4 MG prestressed concrete circular reservoir.
- Constructed at grade.

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Residuals Pump Station

- Three submersible residuals pumps.
- Cast-in-place concrete basin (50,000 gallon capacity).

Site Work

- Excavation of soil for new facilities.
- Finish grading and top soil.
- Yard piping.
- Yard valves.
- Miscellaneous yard structures.
- Drive and access road.

Engine Generator

- An engine generator for standby power at the new WTP.

The high service pump station structure will include three high service pumps and space for two future high service pumps. A finished water clearwell with a capacity of 2.4 MG will be provided. The residuals pump station will be used to convey the residuals stream generated at the new water treatment plant to the existing Dillman WWTP.

The intake facility for this plant will be located on Lake Monroe at the IDNR site. The intake structure initially will consist of three 6 mgd pumps for a firm capacity of 12 mgd, with space for two future pumps. The intake facility will be provided with an engine generator for standby power. A new 36-inch raw water main will be installed from the intake facility to the new plant and will include one bored roadway crossing. In addition, a new 36-inch finished water main will be installed from the plant to the distribution system. The total length of raw and finished water piping will be approximately 45,000 feet. The finished water main would convey water directly to the Central service level.

8. PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Retrofitting the existing Monroe WTP will involve removal of the existing filter media and underdrain system and installation of new submerged-type membranes in the existing filter cells. Initially, the total capacity of the membranes will be 24 mgd. Additional membranes can be added in the future, as additional capacity is required. As part of retrofitting the Filter Building, new piping additions and some piping modifications will be required to accommodate the membranes. Also, it is anticipated that a new pre-engineered metal building will be required to house the membrane auxiliary equipment. The building will have an approximate area of 3,000 square feet.

The opinion of probable cost for Alternative B is presented in Table 8-3. This cost includes the associated electrical and instrumentation costs. All costs for the facilities and water mains assume rock excavation.

8. PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Table 8-3
Opinion of Probable Construction Cost for Alternative B
New 12 mgd WTP Adjacent to Dillman WWTP

Item	Cost
Intake Facility	$ 7,500,000
New Water Treatment Plant	
Flocculation/Sedimentation Basins	$ 2,500,000
Membrane Treatment Facility (12 mgd)	$ 6,500,000
Chemical Feed and Storage Facility	$ 2,000,000
High Service Pump Station	$ 3,700,000
Administrative Facilities	$ 500,000
Laboratory	$ 300,000
Finished Water Storage	$ 1,500,000
Residuals Pump Station	$ 500,000
Site Work	$ 2,000,000
Engine Generator	$ 500,000
Miscellaneous	$ 2,500,000
Subtotal New Water Treatment Plant	$22,500,000
Raw and Finished Water Mains (45,000 LF)	$10,000,000
Subtotal Intake, New WTP, Water Mains	**$40,000,000**
Retrofit Monroe WTP	
24 mgd Membrane Filtration System	$11,000,000
Miscellaneous	$ 1,000,000
Subtotal Retrofit Monroe WTP	**$12,000,000**
Subtotal Probable Cost for Alternative B	**$52,000,000**
Contingencies (20%)	$10,400,000
Total Probable Cost for Alternative B	**$62,400,000**

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3. Alternative C. New 12 mgd North water treatment plant using groundwater and treatment using membrane filtration for solids removal and reverse osmosis for softening. This alternative also includes retrofitting the Monroe WTP with a membrane filtration system with a capacity of 24 mgd.

Under Alternative C, a new 12 mgd water treatment plant will be constructed north of Bloomington, possibly near the Blucher Poole WWTP or along Route 37 near Bean Blossom Creek. The new water treatment plant will consist of the following:

- Collector well (14 mgd capacity)
- Ultrafiltration/microfiltration membrane facility (14 mgd capacity).
- Reverse osmosis facility for softening (treating approximately 70 percent of the plant flow).
- Chemical feed and storage facility.
- High service pump station.
- Administrative facilities and laboratory.
- Finished water storage reservoir.
- Residuals pump station.
- Site work.
- Engine generators for standby power.

Because water quality data has not been collected at the proposed groundwater sites, it is estimated that the reverse osmosis membranes will have a recovery of approximately 80 percent (20 percent reject stream). Therefore, a 14 mgd collector well and treatment facilities prior to reverse osmosis are required to provide a finished water capacity of 12 mgd.

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For the opinions of probable construction cost for Alternative C, basic assumptions have been made regarding the facility's construction materials, components, equipment, and processes. These assumptions are discussed below.

Collector Well

- Approximately 100 foot deep collector well.
- Caisson constructed of concrete (16 foot diameter).
- Approximately 30 foot by 30 foot pump structure supported by the caisson.
- 3 pumps, each with a 7 mgd capacity.
- 2 pumps equipped with adjustable frequency drives.
- Cast-in-place concrete construction.
- An engine generator for standby power.

Membrane Treatment Facility

- Submerged or cartridge type membranes (14 mgd capacity).
- Concrete boxes to house the submerged membranes or a building with a slab on grade to house the cartridge membranes.
- Pumping equipment.
- Automation and controls.
- Single story, brick and block building.

Reverse Osmosis Facility

- Single story, brick and block building.
- Cast-in-place concrete slab foundation.
- Approximately 13,000 square foot of area.
- Reverse osmosis membranes (7.7 mgd capacity).
- Piping and valves.

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Chemical Feed and Storage Facility

- Single story, brick and block building.
- Cast-in-place concrete foundation.
- Chemical storage and day tanks, designed for liquid storage where practical.
- Metering and feed pumps.

High Service Pump Station

- Brick and block building.
- Cast-in-place concrete foundation.
- 3 pumps at 6 mgd each, with space for 2 additional pumps in the future.
- 2 pumps equipped with adjustable frequency drives.
- Pipe gallery below the operating floor for suction and discharge piping.

Administrative Facilities

- Single story, brick and block building.
- Concrete foundation.
- Offices, storage space, and break room.
- Control room with SCADA system
- Bathrooms with locker facilities.
- Janitor's closet.

Operator Laboratory

- Single story, brick and block building.
- Basic laboratory analysis equipment.
- Laboratory benches and cabinets.

Finished Water Storage

- Prestressed concrete circular reservoir.
- Constructed at grade.

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Residuals Pump Station

- Minimum of three residuals pumps.
- Cast-in-place concrete basin (50,000 gallon capacity).

Site Work

- Excavation of soil for new facilities.
- Finish grading and top soil.
- Yard piping.
- Yard valves.
- Miscellaneous yard structures.
- Drive and access road.

Engine Generators

- An engine generator for standby power at the new WTP.

For the raw and finished water mains construction, it has been assumed that no rock excavation will be required based on available information. Also, a minimal amount of pavement replacement and one bored roadway crossing has been assumed. If the North WTP is located near the Blucher Poole WWTP, approximately 64,000 linear feet of raw water main and 18,500 linear feet of finished water main will be required. Therefore, the opinion of probable construction cost is based on 82,500 linear feet of 36-inch diameter ductile iron water main.

Retrofitting the existing Monroe WTP will involve removal of the existing filter media and underdrain system and installation of new submerged-type membranes in the existing filter cells. Initially, the total capacity of the membranes will be 24 mgd. Additional membranes can be added in the future, as additional capacity is required. As part of retrofitting the Filter Building, new piping additions and some piping modifications will be required to accommodate

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the membranes. Also, it is anticipated that a new pre-engineered metal building will be required to house the membrane auxiliary equipment. The building will have an approximate area of 3,000 square feet.

The opinion of probable cost for Alternative C is presented in Table 8-4. This cost includes the associated electrical and instrumentation costs. All costs for the facilities and water mains assume no rock excavation. However, it is assumed that the new facilities may need to be constructed using deep foundations. In particular if the new plant is located near the Blucher Poole WWTP.

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Table 8-4
Opinion of Probable Construction Cost for Alternative C
New 12 mgd North WTP using Membrane Filtration

Item	Cost
Collector Well	$ 3,000,000
New Water Treatment Plant	
Membrane Treatment Facility (14 mgd)	$ 7,200,000
Reverse Osmosis Membrane Facility (7.7 mgd)	$10,000,000
Chemical Feed and Storage Facility	$ 2,000,000
High Service Pump Station	$ 3,700,000
Administrative Facilities	$ 500,000
Laboratory	$ 300,000
Finished Water Storage	$ 1,500,000
Residuals Pump Station	$ 500,000
Site Work	$ 2,000,000
Engine Generator	$ 500,000
Miscellaneous	$ 2,500,000
Subtotal New Water Treatment Plant	$30,700,000
Raw and Finished Water Mains (85,000 LF)	$16,000,000
Subtotal Well, New WTP, Water Mains	**$49,700,000**
Retrofit Monroe WTP	
24 mgd Membrane Filtration System	$11,000,000
Miscellaneous	$ 1,000,000
Subtotal Retrofit Monroe WTP	**$12,000,000**
Subtotal Probable Construction Cost for Alternative C	**$61,700,000**
Contingencies (20%)	$12,400,000
Total Probable Construction Cost for Alternative C	**$74,100,000**

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As an option to Alternative C (Option 1), the new 12 mgd North water treatment plant would treat the groundwater supply using conventional gravity media filters, in lieu of microfiltration/ultrafiltration membranes, and reverse osmosis for softening. This option also includes retrofitting the existing Monroe WTP with a membrane filtration system with a capacity of 24 mgd.

For the opinions of probable construction cost for Option 1 to Alternative C, basic assumptions have been made regarding the Filter Building's construction materials, components, and equipment. These assumptions are discussed below:

Filter Building

- 4 filters, each with 4.7 mgd capacity at 4 gpm/ft^2 (14 mgd with one filter out of service).
- Cast-in-place concrete boxes.
- Piping gallery.
- Single story, brick and block building.
- Electrical and controls.

The opinion of probable construction cost for Option 1 to Alternative C is presented in Table 8-5. This cost includes the associated electrical and instrumentation costs. All costs for the facilities and water mains assume no rock excavation. However, it is assumed that the new facilities may need to be constructed using deep foundations. In particular if the new plant is located near the Blucher Poole WWTP.

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Table 8-5
Opinion of Probable Construction Cost for Option 1 to Alternative C
New 12 mgd North WTP using Gravity Media Filters

Item	Cost
Collector Well	$ 3,000,000
New Water Treatment Plant	
Filter Building	$ 2,500,000
Reverse Osmosis Membrane Facility (7.7 mgd)	$10,000,000
Chemical Feed and Storage Facility	$ 2,000,000
High Service Pump Station	$ 3,700,000
Administrative Facilities	$ 500,000
Laboratory	$ 300,000
Finished Water Storage	$ 1,500,000
Residuals Pump Station	$ 500,000
Site Work	$ 2,000,000
Engine Generator	$ 500,000
Miscellaneous	$ 2,500,000
Subtotal New Water Treatment Plant	$26,000,000
Raw and Finished Water Mains (85,000 LF)	$16,000,000
Subtotal Well, New WTP, Water Mains	**$45,000,000**
Retrofit Monroe WTP	
24 mgd Membrane Filtration System	$11,000,000
Miscellaneous	$ 1,000,000
Subtotal Retrofit Monroe WTP	**$12,000,000**
Subtotal Probable Construction Cost for Option 1 to Alternative C	**$57,000,000**
Contingencies (20%)	$11,400,000
Total Probable Construction Cost for Option 1 to Alternative C	**$68,400,000**

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A second option to Alternative C is to treat water from Lake Lemon, Bean Blossom Creek, and Griffy Lake. The water qualities of Lake Lemon, Bean Blossom Creek, and Griffy Lake have been assumed to be similar to that of Lake Monroe. Therefore, this option assumes that the treatment processes utilized at the North WTP would be the same as those proposed for the Dillman WTP discussed under Alternative B. This option would include a new intake screen at the Bean Blossom Creek's low head dam and possibly some modifications to the Lake Lemon and Griffy Lake control structures. This option also includes retrofitting the existing Monroe WTP with a membrane filtration system with a capacity of 24 mgd.

Approximately 10,000 linear feet of 30-inch raw and finished water mains are included. It has been assumed that no rock excavation and a minimal amount of pavement restoration will be required for the construction of the mains.

The opinion of probable construction cost for Option 2 to Alternative C is presented in Table 8-6. This cost includes the associated electrical and instrumentation costs. All costs for the facilities and water mains assume no rock excavation. However, it is assumed that the new facilities may need to be constructed using deep foundations.

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Table 8-6
Opinion of Probable Construction Cost for Option 2 to Alternative C
New 12 mgd North WTP Using Lake Lemon, Bean Blossom Creek, and Griffy Lake

Item	Cost
Intake Facility	$ 2,000,000
New Water Treatment Plant	
Flocculation/Sedimentation Basins	$ 2,500,000
Membrane Treatment Facility (12 mgd)	$ 6,500,000
Chemical Feed and Storage Facility	$ 2,000,000
High Service and Transfer Pump Station	$ 3,700,000
Administrative Facilities	$ 500,000
Laboratory	$ 300,000
Finished Water Storage	$ 1,500,000
Residuals Pump Station	$ 500,000
Site Work	$ 2,500,000
Engine Generator	$ 500,000
Miscellaneous	$ 2,500,000
Subtotal New Water Treatment Plant	$23,000,000
Raw and Finished Water Mains (10,000 LF)	$ 1,700,000
Subtotal Intake, New WTP, Water Mains	**$26,700,000**
Retrofit Monroe WTP	
24 mgd Membrane Filtration System	$11,000,000
Miscellaneous	$ 1,000,000
Subtotal Retrofit Monroe WTP	**$12,000,000**
Subtotal Probable Cost for Option 2 to Alternative C	**$38,700,000**
Contingencies (20%)	$ 7,800,000
Total Probable Cost for Option 2 to Alternative C	**$46,500,000**

A summary of the opinion of probable construction costs for the alternatives is presented in Table 8-7.

8. PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Table 8-7

8. PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

C. DISTRIBUTION SYSTEM IMPROVEMENTS

As indicated in Chapter 7, there are several water main improvements necessary to satisfy future water demand requirements. Also included in the list of improvements are planned improvements identified by CBU to be constructed within the next five years. CBU has indicated that the main improvements will be constructed with CBU staff. Therefore, an opinion of probable construction cost has not been developed for the main improvements.

The distribution system improvements also may include an altitude valve. As indicated in Chapter 7, if Alternative A is selected, an altitude valve for the East tank is recommended. If Alternative C is selected, an altitude valve for the Redbud tank is recommended. In either case, a 20-inch altitude valve is recommended. The opinion of probable construction cost for a 20-inch altitude valve, isolation valves, piping, Sitework, and a concrete valve vault is $220,000 including 20 percent contingencies. This does not include legal, administration, and engineering costs.